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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Isamu TAKAHARA et al.

Attn: PCT Branch

Application No. New U.S. National Stage of PCT/JP03/03148

Filed: September 28, 2004

Docket No.: 121230

For: INITIATOR

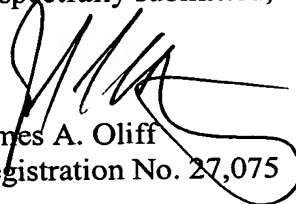
**TRANSLATION OF THE ANNEXES TO THE
INTERNATIONAL PRELIMINARY EXAMINATION REPORT**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Attached hereto is a translation of the annexes to the International Preliminary Examination Report (Form PCT/IPEA/409). The attached translated material replaces the material in the specification on pages 1-5, 19 and the claims.

Respectfully submitted,


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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Translation

PCT Application
PCT/JP2003/003148



Applicant's or agent's file reference PA0079WO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/JP2003/003148	International filing date (day/month/year) 17 March 2003 (17.03.2003)	Priority date (day/month/year) 29 March 2002 (29.03.2002)
International Patent Classification (IPC) or national classification and IPC F42B 3/12, B60R 21/26		
Applicant TOYOTA JIDOSHA KABUSHIKI KAISHA		

- This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 3 sheets, including this cover sheet.
The report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been filed and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 60 and Section 607 of the Administrative Instructions under the PCT).
These annexes consist of a total of 8 sheets.

- This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 03 June 2003 (03.06.2003)	Date of completion of this report 28 November 2003 (28.11.2003)
Name and mailing address of the IPEA/JP	Authorized officer
Facsimile No.	Telephone No.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/JP2003/003148

I. Basis of the report

1. With regard to the elements of the international application:*

☐ the international application as originally filed☒ the description:pages 5-10, as originally filed

pages _____, filed with the demand

pages 1-3, 11, filed with the letter of 26 September 2003 (26.09.2003)☒ the claims:

pages _____, as originally filed

pages _____, as amended (together with any statement under Article 19

pages _____, filed with the demand

pages 34-36, filed with the letter of 26 September 2003 (26.09.2003)☒ the drawings:pages 1-13, as originally filed

pages _____, filed with the demand

pages _____, filed with the letter of _____

☐ the sequence listing part of the description:

pages _____, as originally filed

pages _____, filed with the demand

pages _____, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).☐ the language of publication of the international application (under Rule 48.3(b)).☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.☐ filed together with the international application in computer readable form.☐ furnished subsequently to this Authority in written form.☐ furnished subsequently to this Authority in computer readable form.☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.4. ☒ The amendments have resulted in the cancellation of:☒ the description, pages 4☒ the claims, Nos. 1-33☐ the drawings, sheets/fig _____5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/JP03/03148

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	34-36	YES
	Claims		NO
Inventive step (IS)	Claims		YES
	Claims	34-36	NO
Industrial applicability (IA)	Claims	34-36	YES
	Claims		NO

2. Citations and explanations

Document 1: JP, 10-47892, A (Uchihashi Esutekku Kabushiki Kaisha), 20 February, 1998

Document 2: JP, 9-126697, A (Uchihashi Esutekku Kabushiki Kaisha), 16 May, 1997

Document 3: JP, 2001-21293, A (Nippon Kayaku Co., Ltd.), 26 January, 2001

Document 4: WO, 98/10236, A1 (Teledyne Industries, Inc.), 12 March, 1998

Document 2 cited in the ISR discloses the points about forming a taper part and interposing a glass between a lead pin and taper pore; thus the inventions relating to claims 34-36 do not appear to involve an inventive step based on document 2 cited in the ISR.

DESCRIPTION

INITIATOR

TECHNICAL FIELD

The present invention relates to an initiator to be employed in, for example, an airbag apparatus or a seatbelt pre-tensioner, either of which is to be furnished in a vehicle.

BACKGROUND ART

One of various known types of initiators is constituted by a pair of electrodes joined together via an insulator; a bridge wire connected with these two electrodes and adapted to generate heat when energized; and a casing that hermetically accommodates the bridge wire and an explosive able to detonate in response to heat generation of the bridge wire. This type of initiator is disclosed in, for example, Japanese Patent Application Laid-Open (*kokai*) Nos. 2000-241099 and H11-301402.

In some cases, the components constituting the aforementioned conventional initiator, such as the electrodes and the insulator, receive high temperature and high pressure generated through detonation of the explosive. Therefore, the constitutive components (e.g., the electrodes and the insulator) are required to have high heat resistance and high pressure resistance. As an inflator for an airbag apparatus has been reduced in size, the pressure of a gas stored in the inflator has been increased. In accordance with this tendency, a load (high temperature and high pressure) applied to an initiator mounted on the inflator has been

increased. Therefore, demand has arisen for enhancing the pressure resistance of the initiator.

DISCLOSURE OF THE INVENTION

To solve the above-mentioned problems, the present invention provides an initiator comprising, as constitutive components, a conductive header formed from a conductive metal into a tubular shape and having a hole; a first lead pin (electrode) integrally assembled to the conductive header; a second lead pin (electrode) integrally assembled to the hole of the conductive header via an insulating member and penetrating the conductive header and the insulating member; a bridge wire connected between an inner end of the second lead pin and an inner end of the conductive head and generating heat upon supply of electricity thereto; and a cup-shaped casing airtightly fixed, at an open end portion, to an outer circumference of the conductive header and accommodating, in a sealed condition, the bridge wire and an explosive which detonates in response to heat generation of the bridge wire, wherein the hole of the conductive header and the insulating member fitted into the hole have respective taper portions in a region where the insulating member is joined to the conductive header, the taper portions having diameters decreasing with increasing distance from the explosive. In this case, the taper portions are preferably provided over the enter region where the insulating member is joined to the conductive head. The insulating member may be formed of heat- and pressure-resistant glass.

With this configuration, when the insulating member and the second lead pin penetrating the insulating member receive pressure generated through detonation of the explosive, the taper portions formed in the region

where the insulating member is joined to the conductive head increase the engagement force between the insulating member and the conductive header stemming from the pressure generated through detonation of the explosive (resistance force against the pressure generated through detonation of the explosive), and increases the engagement force between the insulating member and the second lead pin (resistance force against the pressure generated through detonation of the explosive). Therefore, the positional relation between the insulating member and the conductive header and the positional relation between the insulating member and the second lead pin are maintained, and damage to the initiator is suppressed.

In this case, when the taper portions are provided over the enter region where the insulating member is joined to the conductive head, the above-mentioned resistance force can be attained over the enter region where the insulating member is joined to the conductive head, removal of a component from an adjacent component is prevented, and damage to the initiator is suppressed.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cross-sectional view showing an inflator for an airbag apparatus incorporating an initiator;

FIG. 2 is an enlarged cross-sectional view showing an essential portion of the initiator shown in FIG. 1;

FIG. 3 is a cross-sectional view showing a first modification of the initiator shown in FIG. 2;

FIG. 4 is a cross-sectional view showing a second modification of the initiator shown in FIG. 2;

FIG. 5 is a cross-sectional view showing a third modification of the initiator shown in FIG. 2;

FIG. 6 is a cross-sectional view showing a fourth modification of the initiator shown in FIG. 2;

FIG. 7 is a cross-sectional view showing a fifth modification of the initiator shown in FIG. 2;

FIG. 8 is a cross-sectional view showing a sixth modification of the initiator shown in FIG. 2;

FIG. 9 is a cross-sectional view showing a seventh modification of the initiator shown in FIG. 2;

FIG. 10 is a cross-sectional view showing an eighth modification of the initiator shown in FIG. 2;

FIG. 11 is a cross-sectional view showing a ninth modification of the initiator shown in FIG. 2;

FIG. 12 is a cross-sectional view showing a tenth modification of the initiator shown in FIG. 2; and

FIG. 13 is a cross-sectional view showing an eleventh modification of the initiator shown in FIG. 2.

BEST MODE FOR CARRYING OUT THE INVENTION

An embodiment of the present invention will now be described with the drawings. FIG. 1 shows an inflator 10 for an airbag apparatus to be mounted in a vehicle, the inflator 10 incorporating an initiator 20. The inflator 10 of the present embodiment includes a casing 11 and a gas sealing lid 12 mounted in an airtight manner in the casing 11. The casing 11 has a gas storage portion 11a, in which a high-pressure gas is enclosed,

and an attachment portion 11b to which the initiator 20 is attached. The gas sealing lid 12 can be broken through detonation of the initiator 20.

When the gas sealing lid 12 is not broken as shown in FIG. 1, a high-pressure gas is accommodated in the gas storage portion 11a of the casing 11. When the gas sealing lid 12 is broken upon detonation of the initiator 20, as shown by two-dot chain arrows of FIG. 1, the high-pressure gas spurts out of the gas storage portion 11a of the casing 11 toward an airbag (not shown) via outflow openings 11b1 formed in the attachment portion 11b.

Meanwhile, the initiator 20 includes a plurality of components shown,

In the above-described embodiment, the initiator 20 of the present invention is employed in the inflator 10 which is for use in an airbag apparatus and is equipped with the casing 11 and the gas sealing lid 12. Alternatively, the initiator of the present invention may be employed in another type of inflator (e.g., an inflator equipped with a casing containing a gas generating agent which generates gas upon combustion) or another type of apparatus (e.g., a seatbelt pre-tensioner). In the present invention, for example, the embodiment shown in FIG. 4 (i.e., pressure resistance is enhanced by means of the engagement configuration at the boundary between the conductive header 22 and the insulator 23) may be employed in combination with the modification shown in FIG. 8 (i.e., pressure resistance is enhanced by means of the engagement configuration at the boundary between the lead pin 21b and the insulator 23).

CLAIMS

1. (Deleted)

2. (Deleted)

3. (Deleted)

4. (Deleted)

5. (Deleted)

6. (Deleted)

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27. (Deleted)

28. (Deleted)

29. (Deleted)

30. (Deleted)

31. (Deleted)

32. (Deleted)

33. (Deleted)

34. (Added) An initiator comprising, as constitutive components, a conductive header formed from a conductive metal into a tubular shape; a first lead pin integrally assembled to the conductive header; a second lead pin integrally assembled to a hole formed in the conductive header via an insulating member and penetrating the conductive header and the insulating member; a bridge wire connected between an inner end of the second lead pin and an inner end of the conductive head and generating heat upon supply of electricity thereto; and a cup-shaped casing airtightly fixed, at an open end portion, to an outer circumference of the conductive header and accommodating, in a sealed condition, the bridge wire and an explosive which detonates in response to heat generation of the bridge wire, wherein

the hole of the conductive header and the insulating member fitted into the hole have respective taper portions in a region where the insulating member is joined to the conductive header, the taper portions having diameters decreasing with increasing distance from the explosive.

35. (Added) An initiator according to claim 34, wherein the taper portions are provided over the enter region where the insulating member is joined to the conductive head.

36. (Added) An initiator according to claim 34 or 35, wherein the insulating member is formed of heat- and pressure-resistant glass.

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